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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,803	06/28/2001	Bharath Rangarajan	F0660	7099

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EXAMINER

ROSENBERGER, RICHARD A

ART UNIT	PAPER NUMBER
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2877

DATE MAILED: 01/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/893,803

Applicant(s)

RANGARAJAN ET AL.

Examiner

Richard A Rosenberger

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

1. The arguments in the Appeal Brief filed 17 October 2003 have been considered, and have raised sufficient questions and issues that make it appear that this application is not ripe for appeal. Further, the Brief does not treat the final rejection that was actually made (see section 7 below), which further illustrates that this application is not ripe for appeal. Therefore the finality of the previous office action is withdrawn, and the following rejection made.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The specification is objected to and claims 1-29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The specification and claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification in this application does not describe how to make and use scatterometry to measure multi-sloped semiconductor features or devices, and does not disclose how to use such scatterometry measurements to control the etching of such multi-sloped features and devices. Those in the art, reading the instant

specification, would not be able to make and use scatterometry to control the etching of multi-sloped devices.

The instant specification states that etching multi-slope features and devices is well-known in the art, stating, for example, "Such etching components are known in the art, and thus discussion thereof is limited herein for the sake of brevity" [page 3, lines 20-21].

The instant specification also sets forth that scatterometry is known in the art, indeed, it specifically states that it is not fully disclosing how to make and use a scatterometry system. In the instant specification, it is stated that "[s]catterometry systems are well known in the art and therefore further discussion related thereto is limited for sake of brevity" [page 12, lines 14-16]. Further, in terms of the use of the interpretations of the results of such scatterometry systems suitable for use in the instant specification, the instant specification states "[t]he manner in which the processor 814 can be programmed to carry out the functions relating to the present invention will be readily apparent to those having ordinary skill in the art based on the description provided herein" [page 12, lines 18-21].

In the previous office actions, this characterization of the prior art was taken at face value as representing the state of the art; that those in the art already knew how to perform and control the appropriate etching and perform and understand the appropriate scatterometry. As such, the disclosure would be sufficient; the specification does not need to set forth in detail that which is so well-known in the

art that this sort of general reference will adequately point those in the art to the relevant practices and know-how in the art.

However, the Appeal Brief filed 17 October 2003 argues that this understanding of the specification is mistaken. For instance, the Appeal Brief argues that the art does not “teach or suggest a system for regulating an etch process for creating *multi-sloped features*” [emphasis in original]; see the Brief, page 3, lines 24-25. See also similar remarks emphasizing that the art does not teach fabricating a multi-sloped feature on page 4, lines 3-4 and lines 9-11. The Brief also argues that “such a scatterometry technique provides for advantages *over conventional systems*” [emphasis added] (page 4, lines 19-20) and that the art does not “teach or suggest a scatterometry component as part of a measuring system that measures an etch parameters *via* properties of reflected light” (page 4, lines 24-25).

Thus the Brief argues that there is something patentable in the etching of multi-slope features and/or the use of scatterometry to measure them. However, the instant specification does not disclose either of these in terms sufficient to allow those in the art to make and use them. The arguments in the Brief, by arguing that fabrication of multi-sloped features and measuring them by scatterometry can be given patentable weight, is arguing that the specification was misunderstood when it was taken to acknowledge that these were in fact well-known in the art and thus adequately disclosed. As they are being argued as not having been well-known in

the art, then they are clearly inadequately disclosed under 35 USC 112, first paragraph.

4. Assuming that the specification as filed is adequate, that is, assuming that those in the art did know, or would have found obvious without undue experimentation, how to etch multi-slope features and how to control such etching, and did know or would have found obvious without undue experimentation, how to measure such multi-slope features by scatterometry, then the following rejection be appropriate.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al (US 6,643,557) in view of the acknowledged prior art.

Miller et al teaches using scatterometry to control an etch process; see figure 4 in particular, with box 420 ("acquire and analyze scatterometry data") and boxes 440 and 450 ("perform feedback corrections" and "perform feed-forward corrections", respectively).

Miller does not explicitly teach using scatterometry to measure “multi-slope features”, although that reference does teach using is to obtain “line shape adjustments” (column 5, lines 19-21 and column 8, lines 13-15). The instant specification presents the necessary scatterometry techniques to practice the invention as being known in the prior art (page 12, lines 12-16: “The scatterometry system 822 employed in the measuring system may be any scatterometry system suitable to carry out the present . . . [s]catterometry systems are well known in the art and therefore further discussion related thereto is limited for sake of brevity.”).

As those in the art, as shown by Miller, knew that scatterometry can be used to control an etch process including “line shape adjustments”, and knew that scatterometry could be used to measure multi-slope features, it would have been obvious to control such multi-slope features using scatterometry in a system such as taught by Miller et al.

7. It is noted that the Appeal Brief filed 17 October 2003 does not respond to the rejection that was in fact made. The Appeal Brief presents the rejection as “being obvious over Ausschnitt in view of Coronel *et al*” (Brief, page 3, lines 16-17). This is *not* the grounds of the final rejection; the final rejection was made as being obvious over “ Ausschnitt (US 5,629,772) in view of the acknowledged prior art of the instant specification and Coronel et al (US 5,658,418)” [emphasis added].

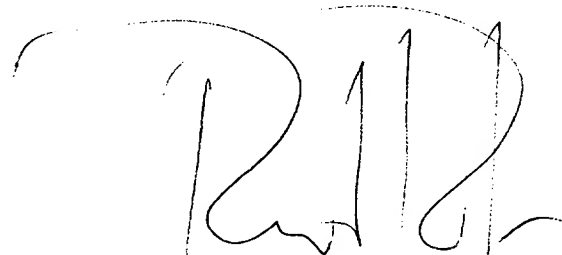
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8. Papers related to this application may be submitted to Group 2800 by facsimile transmission. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The fax number is (703) 872-9306

Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. A. Rosenberger whose telephone number is (703) 308-4804.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

R. A. Rosenberger
22 December 2003

A handwritten signature in black ink, appearing to read 'R. A. Rosenberger', with a large, stylized 'R' and 'A'.

Richard A. Rosenberger
Primary Examiner